FIVE YEARS WITH MICROCOMPUTERS (Editorial)

In December I once again was the guest speaker for TRUGEM, the TRS-80 Users Group of Eastern Massachusetts. TRUGEM was the first TRS-80 group in the world when Mark Falk, Morris Herman and I founded it in November 1977. We were important people then. We actually used TRS-80's while most of the club was still awaiting delivery! The return visit to my old club made me realize that it has been over five years since we started our own real-life microcomputer adventures.

It was August 1977 when Jill and I decided to buy one of those new microcomputers, and what a good decision it was! We had been looking for about six months, but we were unsure about the considerable amounts of soldering and low-level programming that "came with the territory" back then. Jill had been working on big mainframe computers for about ten years, and in my electrooptical engineering work I had enjoyed occasional computer access via TELCOMP-IV, a BASIC-like language, on a time-share terminal.

When the first popular "appliance" computers, the Commodore Pet, Apple II and Radio Shack TRS-80 Model I, announced simultaneously in Summer 1977, we sensed our time had come. At last, practical computers were ready to move into the house. We were lucky enough to attend Radio Shack's unveiling of the TRS-80 at a computer show at Boston University, and we were convinced. We ordered a TRS-80 Model I from project manager Don French on the following day.

Within two months the Miller home welcomed not one but two of the newcomers. Our second TRS-80 arrived by mistake but stayed to become the basis for our first computer venture: an innovative and useful microcomputer rental service giving potential buyers, and Radio Shack dealers, a chance to "try before you buy" over a weekend or Monday-through-Friday. Those first Model I's were little things -- just 4K RAM, Level I BASIC in ROM, and a 250-baud cassette recorder -- but we could see they were here to stay. We placed orders for the "two to three months delivery" 48K RAM, Level II BASIC, and disk drives which we needed for serious programming.

Like so many other computer deadlines before and since, that wait turned out to be longer than advertised. And like a few of the others, it was worth it. We inched up from 16K RAM to Level II BASIC, printers (remember when they were a luxury?), 48K RAM and disk drives. From TRS-DOS Version 1.0 (which wouldn't even boot!), through NEWDOS-80 to our own, constantly growing programming solution: MMSFORTH. From "The People's Database" through PIMS (it looked so good until we tried to do real work with it), into THE DATAHANDLER and, this month, DATAHANDLER-PLUS. Through Electric Pencil, Scripsit, and Super-Script into FORTHWRITE. Through "The microFORTH Primer" to "Starting Forth" and our own MMSFORTH Users Manual. And on to the TRS-80 Model III, the IBM PC, and a few special and very impressive custom computer projects.

The first five years have been marvelous. With you, we look forward to the next five and beyond!

-- A. Richard Miller, Editor 4th Class

UNUSUAL ENCOUNTERS OF THE FORTH KIND

Some of our items don't readily fit into the standard categories, but they are useful information to our users. Hence this new department.

THE CASE OF THE TWO-BIT TEXT TWIDDLER

Today's exciting, true-life adventure is a data bug which MMS detected in some saved FORTHWRITE text. As it turned out, it wasn't caused by our software. Our clue was when an otherwise good document (text file) suddenly changed to this:

"Thank you for your note and order of September 29th. Here ks"vje"afditional information you requested.
CUSTOOKZE prompts for a DIRectory Block Number (N..255), meaning between "N" and"257"wjgrg N is the actual lowest available block numbgr shown on screen. Anything lower womuld be accepted, but would overwrite"thg"rrgcomriled portion on the disk."

IF YOU WANT TO DO YOUR OWN SLEUTHING, READ NO FURTHER! The MMS interpretation is as follows. Once the above data deteriorates, each bad letter is 2 higher in ASCII value than it should be. But the errors occur randomly: in the second sample sentence, "additional" has one good d and one bad. When reloading the document again from disk did not change the errors, we bet that the keyboard or disk drive connector cable was making poor contact of the bit-2 data line during the original write operation. We cleaned all related cable and card-edge contacts and experienced no further problems. Case closed.

NEW AT MMS

INTRODUCING, MMSFORTH VERSION 2.2 FOR IBM PC!

As this is written, MMSFORTH V2.2 is in beta test phase and is expected to be on the market for your IBM PC in a month or so. This newest release is highly compatible with our earlier V2.0 for TRS-80 and V2.1 for IBM PC and introduces many additional features:

1. Multiple-threaded vocabularies, which are more user-friendly and **compile up to 8 times faster.**
2. Even greater uniqueness of wordname hashing.
3. Disk error reporting.
4. Greater ease and flexibility in allocating **double-sided and unusual disk formats,** with 14-element DISKDATA array and new CUSTOMIZE, FORMAT and BACKUP.
5. Default "SYS" disk format of 5K bytes/track, except 4K (IBM PC-format) Track 0 for boot sectors, offering you **25% more disk capacity.**
6. A **virtual disk** utility which transforms a portion of your "extra" RAM to a very fast "apparent" disk drive.
7. **VECT,** a new **vectored execution** mechanism.
8. A new, more flexible mechanism for **vectored I/O.**
9. A new **QUAN** concept which is faster and more versatile than VARIABLE.
10. An optional **Floating-Point Assembler** extension supporting the 8087 fast-math chip. (MMS stocks the chip, too.)
11. A new keyboard driver with improved typeahead and variable speed auto repeat.
12. CLOCK Extension now updates date at midnight.
13. The Editor now accepts literal inputs: ASCII code values, etc.
14. **Temporary headers** and temporary definitions.
15. **Single-key macros.**
16. Standard printer-drivers can incorporate **large-RAM printer spooling,** saving you the cost of a $100-300 hardware printer-spooler.

In brief, V2.2 brings new speed, ease and power to the advanced user, and provides new tools for MMS to bring the casual user better and even faster application programming. Few if any Forth words will require changing in typical programs. MMS is adjusting its own earlier programs where necessary, and most are avaialble at this time. Good news for limited budgets: no price changes are involved, and MMS will rewrite your original V2.1 disk and program diskettes for the usual $10 each, plus $2.00 shipping/handling (U.S. and Canada).

If you use the IBM PC, you can start using V2.2 now. If you use TRS-80, expect a version incorporating those V2.2 features which the hardware can support effectively, in several more months.

INTRODUCING, DATAHANDLER-PLUS!

MMSFORTH V2.2 is joined by another major new release this month: **DATAHANDLER-PLUS for the IBM PC.** This is a substantially expanded, upward compatible new product developed from our popular and still available DATAHANDLER database management system. If you've been waiting for THE DATA-HANDLER to take advantage of all those extra hundreds of kilobytes of PC memory for super-fast on-line handling of **thousands of records,** your wish is granted! DATAHANDLER-PLUS also permits **combination selections** of items (vendor OR buyer, AND Kentucky), **addition, deletion or rearrangement of fields,** and **merging** of your existing, smaller records from THE DATA-HANDLER. File-handling is consistant with the newer, more sophisticated operation of FORTHWRITE. SUMALL operations include reeord count and the minimum, maximum and average values. Calculated fields permit **math operations within records** (unit-price x quantity = value), and output fields permit **multi-record calculations** (subtotal), as well.

There's more. We believe you'll agree that DATAHANDLER-PLUS performance on the IBM PC is spectacular. And, it can transfer your old DATAHANDLER files from IBM PC or TRS-80 Model III formats. However, users doing extensive work on both the IBM PC and the TRS-80 computers may want their IBM PC to have a plain DATAHANDLER, as well, for maximum compatibility on both types of computer. The price of DATAHANDLER-PLUS is $99.95 (plus S/H), and beta test copies are available immediately. Through March 1983, present IBM PC users of THE DATAHANDLER **who will cancel use of that version** are invited to return it to MMS for rewrite to DATAHANDLER-PLUS for $10.00 plus the $40.00 differenee in price and S/H.

TECHNICAL PAPER: A FILE SYSTEM IN FORTH
by John Rible and Tom Dowling, Miller Microcomputer Services
(presented at the Forth Modification Laboratory,
Monterey, California, November 1981)

INTRODUCTION

A computer application such as a word processor requires that many independent files be kept separate and that access not rely on the operator's remembering their locations on disk. The present-day microcomputer with floppy disk drives suffers from slow access and data transfer to and from its mass storage. Floppy disks have removable media and operator diskette changes could lead to disastrous results if not recognized. A file system with a directory was developed to allow disk file reference by name, to control disk accesses and to allow the diskette to be safely changed whenever the drive is stopped.

BACKGROUND

For over two years, MMS has been using this simple file system and directory scheme with its DATAHANDLER (tm) data based filing system. Two new products, FORTHWRITE (tm) and MMSFORTH GENERAL LEDGER (tm), also use this method. It is described here in its simplest form as a good trade-off for microcomputer filing systems under FORTH. The high performance of these programs demonstrates the usefulness of this approach in applications with very different file structures and uses.

IMPLEMENTATION

This file system stores the directory information in the lowest block(s) of the files area. This includes the directory check word (a 32-bit value which is used to identify valid directory blocks), the directory title, the maximum number of files, the total number of blocks in the files area, a table for block linkage pointers, and a table of file information. The file information table includes the names of files and a pointer to the first block of each file.

The block pointers are relative offsets from the first directory block and are set to zero if there are no (more) blocks in the file. All unused blocks are linked to the zeroth file, "FREE", which is used for allocation and deallocation of blocks.

The directory can be initialized so that the files area covers part of a diskette, all of a diskette, or spans several diskettes. A files diskette can be placed in any drive and still work because all block positions are relative to its directory location.

Since all links for a particular file reside in the directory block(s), an arbitrary block can be found by following this chain and not having to read the file. For fast access to read-only files without requiring the reading of the directory, these links can be read into an in-memory array.

In our implementations of the directory we've used the following conventions: the presence of a file in the directory is signalled by a non-zero length name; the file table offset is a multiple of sixteen, the size of an entry, so no file table entry crosses a block boundary; and for fastest access, directories are usually limited to one block.

The block allocation/deallocation scheme may be changed to assign contiguous or non-contiguous blocks depending on the application. There is no requirement for file arrangement, but alphabetically ordered directories have been implemented. Some implementations also allow several directories to be active simultaneously and to be accessed in an ordered fashion.

As implemented, file names may contain up to 13 characters and the directory title may contain up to 63. By shortening these maximum lengths, additional information may be kept, such as dates, passwords, file type information, etc.

Permission is given to use the following simplified code in non-commercial applications, provided credit is given to MMS.

```
0 ( 10/28/81 Directory, 1 of 3, Copyright 1981 by MMS )
1
2 ( MMSFORTH stores strings in the WORD format: character count
3   in the first byte followed by the character string )
4
5
6
7 CODE $COMPARE   ( $1addr $2addr -> -1:0:1 , when $1 < = > $2 )
8 ( In MMSFORTH this is a CODE word for speed; you must add it
9   to your system if not already available.                  )
10
11 156 CONSTANT DBLK ( directory block; first block of file area )
12
13 CREATE DBID 12345 , 6789 ,  ( directory identifing number )
14
15                                                         -->
```

SOME FORTH UTILITY WORDS (Part 2), by Russ Hensel

At the start of Part I, I should have mentioned that my utility words have been tested on TRS-80 Model 1 only. Last issue's first example, for instance, refers to specific TRS-80 memory locations for the screen RAM and for the cursor position. But most of these ideas should translate easily to Model III and even IBM PC. Here's some more for those who like it.

A LITTLE EDITING

Generally, input to programs is made more difficult if any attempt is made to give editing features to the program. A word that I use to allow simple editing is listed on the next blocks. When used, it gives you an opportunity to see the current value of a variable and change it. Hitting ENTER keeps the value the same. Note that as written here IN#-> uses the word VAL+. It could be written to use VAL instead.

```
0 CR ." 70  IN#->        +-LEN                    2.0-011582 "
1 : +-LEN ( $ -> N ) ( N = LEN if 1st chr not numeric else -LEN )
2        DUP LEN SWAP 1+ C@ ?NUM IF NEGATE THEN ;
3 : IN#-> ( A -> ) ( Input into adr A with default to old value )
4   DUP ." = " ? ." -> " IN$  20 LEET$ DUP +-LEN 0 <
5      IF  VAL+ SWAP ! ELSE DROP  ? THEN ;
6
7 ( Beginning of test for IN#-> )
8 (  0 VARIABLE A   20 $VARIABLE $#BUEER              (  )
9 (  : TEST 10 0 DO A CR IN#->      LOOP   ; (  )
10 (  : TE  IN$ $#BUFER $! $#BUFER +-LEN   (  )
11 (    DUP 0 > CR  IF  ." STR " . ELSE ." NUM " . THEN CR ; (  )
```

```
0 CR ." 69  IN#->    ?NUM                     2.0-011582 "
1 : TASK TASK CR ." IN#->  011582"        ;
2 ( Needs STRINGS  )
3
4
5
6 : ?NUM  ( C-> T/F ) ( T if char is numeric else E )
7      DUP 42 > OVER 58 < AND  ( + - are numeric )
8      IE DUP 44 = NOT OVER 47 = NOT AND
9        IE DROP 1
10        THEN
11      ELSE DROP 0
12      THEN ;          -->     (  )
```

```
0 ( 10/28/81 Directory, 2 of 3, Copyright 1981 by MMS )
1
2 : DADR ( offset -> , define directory variables )  CONSTANT
3   DOES> @ DBLK BLOCK + ;
4
5  4 DADR EMAX    ( -> addr , of maximum # of data area files )
6  6 DADR BMAX    ( -> addr , of maximum # of data area blocks )
7  8 DADR OFESET  ( -> addr , of first 16 character file field )
8 10 DADR DTITLE  ( -> $addr , max 63 character string )
9
10 : EADR ( offset -> , define file variables )  CONSTANT
11   DOES> @ SWAP 16 * + OFESET @ + 1024 /MOD DBLK + BLOCK + ;
12
13  0 EADR )NAME ( n -> $addr , of string name of file n )
14 14 EADR )FBLK ( n -> addr , of rel-blk# of 1st blk in file n )
15                                                         -->
```

```
0 ( 10/28/81 Directory, 3 of 3, Copyright 1981 by MMS )
1
2 : )NBLK  ( n -> addr , of rel-blk# following rel-blk# n )
3   2* 74 + 1024 /MOD DBLK + BLOCK + ;
4
5 : #BLKS ( n1 -> n2 , n2 blocks are in file n1 )
6   0 SWAP )FBLK BEGIN @ ?DUP WHILE SWAP 1+ SWAP )NBLK REPEAT ;
7
8 : #FILES ( -> n , number of available files )
9   0 FMAX @ 1 DO I )NAME C@ 0= IF 1+ THEN LOOP ;
10
11 : .FILE ( n -> , output file n directory entry )
12   20 OVER )NAME DUP COUNT TYPE ROT #BLKS 4 .R C@ 4 + - SPACES ;
13
14 : FREE ( , output "available disk space" message ) CR 0 #BLKS
15   ." Room for " . ." blocks & " #FILES . ." files." ;      -->
```

MMSFORTH EDITOR CUSTOM MODIFICATION TECHNIQUES

What better target for some special modifications than the MMSFORTH full-screen Editor you use so much? Our thanks to several members of the MMSFORTH Users Group of Eastern Massachusetts for the easy first mod (it will be in the next release of MMSFORTH), then to MMS staffer John Rible for the fancier one.

Add FLUSH into the Editor, by the very simple expedient of splicing it into the keyboard scan NCASE routine in the final block of the Editor. That routine is coded in hexadecimal, so to assign an Alternate-F to the FLUSH operation first determine that hex code by entering: HEX KEY , DECIMAL [Enter]. Then press Alternate-F and the proper value will be returned, in hex. Edit that value into the (second) NCASE statement in the last Editor block, perhaps on the right end of its first line. Then just insert the word FLUSH in the equivalent position, two lines down. Finally, reprecompile and CUSTOMIZE the new items, from Block 15 (TRS-80) or Block 20 (1BM PC).

Using this new tool, you now can save an edited block to disk by pressing A-U to UPDATE and then A-F to FLUSH. As usual, you will have to reduce the value in PBLK if it is higher than the block number you wish to rewrite to disk.

The following set of Editor modification words by John Rible is more advanced, but still well within the capabilities of most MMSFORTH users. If you're good enough to do it, you'll also be able to read all about it from John's in-line comments.

```
Block 150 [150 :0]

0 ( 09/15/82 JWR  EDITOR Block:Drive words )
1
2 : >B:D ( blk# -> rel-bl# drv# )  0 BEGIN SWAP OVER DISKDATA @
3   OVER <= WHILE OVER DISKDATA @ - SWAP 1+ REPEAT  SWAP ;
4
5 : B:D> ( rel-bl# drv# -> bl# )
6   ?DUP IF 0 DO I DISKDATA @ + LOOP THEN ;
7
8 : .B:D ( blk# -> )  >B:D SWAP 4 .R ." :" . ;
9
10 ( At the right end of Block 37 Line 0 add " n LOAD ", where n )
11 ( is this block #.                                          )
12
13 ( Replace the " ? " in the 1st line of the EDITOR word " [B " )
14 (  in Block 37 with the words " @ .B:D ".                     )
15
```

```
Block 151 [151 :0]

0 ( 09/15/82 JWR  EDITOR Mark-date command )
1
2 : SET-DATE ( mo da yr -> ) 16925 16922 DO #DATE I + C! LOOP ;
3 : GET-DATE ( -> yr da mo ) 16925 16922 DO #DATE I + C@ LOOP ;
4 ( These lines aren't needed if the CLOCK Extension is loaded. )
5
6
7 : !D  GET-DATE SWAP ROT <# 0 # # 47 HOLD  2DROP 0 # # 47 HOLD
8   2DROP 0 # # #> BSTART 2+ ( where date is going ) SWAP CMOVE ;
9
10 ( At the right end of BLock 38 Line 0 add " n LOAD ", where n )
11 ( is this block #.                                          )
12
13 ( In EDITOR word ES, add  "8D" just below "NCASE" and "!D"   )
14 ( two lines below that.  Now Alternate-M will MARK each screen )
15 ( with the date you've preset with "mo da yr SET-DATE".      )
```

```
Block 152 [152 :0]

0 ( 09/15/82 JWR  EDITOR Next-block command )
1
2 : [N  -1 BEGIN 1+ DUP BUFFDATA @ SCR @ = UNTIL
3   BEGIN 1+ #BKS C@ MOD DUP BUFFDATA @ 0< NOT UNTIL
4   BUFFDATA @ ZSTART [B ;
5
6
7
8 ( At the right end of Block 38 Line 0 add " n LOAD ", where n )
9 ( is this block #.                                          )
10
11 ( In EDITOR word ES, add " 8E " at end of line below " NCASE " )
12 ( and " [N " two lines below that.  Now Alternate-N will get   )
13 ( the NEXT screen in the buffers.  This is VERY handy if you're)
14 ( using more than two block buffers.                        )
15
```

FORTHWRITE - SETTINGS FOR OKIDATA AND SPINWRITER PRINTERS

FORTHWRITE, our hot-shot word processor, is complete (effective 11/16/82, with a patch to its DWII printer-driver on 11/23/82) and so is its final documentation. It's mighty nice. Your local dealer **should** have it and we do if he doesn't. See the January 1983 issue of 80-MICRO magazine for Wynne Keller's very complimentary article on FORTHWRITE. Better yet, buy FORTHWRITE and use it to review any MMSFORTH product. When it's published, MMS will send you a complimentary MMS software package, just like we did for Wynne!

If we didn't tell you yet, here is some additional information for using FORTHWRITE with a few printers. Okidata Microline 80, 82A, 83A, etc.: set switches for standard mode, not TRS-80 mode. Epson MX-80 driver: if necessary, set printer driver again so you can specify with or without Graftrax option. NEC Spinwriter 7730: reading from the left on the front panel, Switches 1-1 and 2-8 must be UP; Switch 2-7 should be UP for TRS-80 and DOWN for 1BM PC. And don't forget the recommended wiring mod to the 1BM PC's parallel printer cable, as explained in our prior issue.

GENERAL LEDGER

Adequate draft documentation now exists, and additional beta test sites are putting it to good use. Is this a good time for you to switch your books to a more efficient system, also?

TURTLE GRAPHICS FOR IBM PERSONAL COMPUTER

MMS announced our graphics and Turtle Graphics additions to the 1BM PC Utilities Diskette in the prior issue of this Newsletter. Since then, MMS has further supported these new utilities with medium- and high-resolution graphics screendump drivers for several printers: NEC 8023A-C, C.ltoh ProWriter, Epson MX-80 with Graftrax option, Okidata Microline-82A or -83A with optional dot-plot ROM, and Microline-84. In addition to dumping the entire display screen, any screen window may be dumped by name. Detail is quite good, and an optional 90-degrees rotation gets the most detail onto the available page of paper.

Hardware requirements: graphics board and a measly 32K of RAM. New cost: on the MMSFORTH Utilities Diskette (IBM PC) for the same old $39.95. Rewrite policy: $10.00 plus $2.00 shipping/handling (U.S. and Canada). Fair enough?

ACTION GRAPHICS -- A DEMO DISKETTE

Looking for a spectacular, real-time 1BM graphics demo for your next meeting? 1f you're already running Turtle Graphics and your IBM PC has a spare 256K RAM board (for a total of 320K), MMS will be happy to write you a copy of our favorite "Action Graphics" demonstration diskette. This show-stopper by Tom Dowling fills four multi-colored screens with images of the same three-dimensional object simultaneously rotating, pitching and fading away in four different manners. This limited-use demonstration diskette features quick perspective image generation, and easy keyboard loading of three objects (a sailboat, a house and a dodecahedron) with variable, smooth-action display speeds. The generation is done within a mere 32K of RAM, with 16 16K-byte images buffered in 256K of upper memory for rapid display on screen. The price? It's yours for our copy cost of $10.00 plus $2.00 shipping/handling (more overseas).

```
Block 153 [153 :0]

0 ( 01/13/83 JWR  EDITOR Flush & eXchange-line commands )
1
2 : [F  UPDATE FLUSH ;        ( A variation on the first item. )
3
4 : [X  PAD 40 + LSTART OVER 40 CMOVE [R PAD 40 CMOVE ;
5
6
7
8 ( At the right end of Block 38 Line 0 add " n LOAD ", where n )
9 ( is this block #.                                          )
10 ( In EDITOR word ES, move the " over 3 places to add " 86 " and)
11 ( move OTHERWISE over to add " [F ".  This allows you to FLUSH )
12 ( the blocks to disk without leaving the Editor.            )
13 ( In EDITOR word ES, add " 98 " just below " NCASE "        )
14 ( and " [X " two lines below that.  Now Alternate-X will     )
15 ( eXchange the current line with the line in PAD.           )
```

GET-TOGETHER

Share your questions and answers with a MMSFORTH User Croup! Contact MMS for help to start one in your region, or to revive one which seems inactive. Here is our present list of contacts for local MMSFORTH User Croups:

CA: George Creenwald, 9802 Effingham Drive, Huntington Beach 92646 (714/893-7531 x263 days, 968-1037 eves.).
CA: Earl Mortensen, 974 Pleasant Hill Road, Redwood City 94061 (415/367-9882).
CA: Ken Nonomura, 416 Duncan Street, Apt. 5, San Francisco 94131 (415/285-5062).
CA: Rich Royea, 6456 Lubau, Woodland Hills 91367 (213/704-6859).
FL: Bob Vest, 64 NW 111th Street, Miami Shores 33168 (305/751-7511 eves.).
FL: Rich Toussaint, 2158-D West Oakridge Road, Orlando 32809 (305/851-5216 eves.).
1L: Walter Cooper, 5112 West 30th Place, Cicero 60650 (312/656-6183).
LA: Ed Laughery, 1222 Jason Drive, Denham Springs 70726 (504/665-7537).
MA: Jim Cerow, 22 Crestwood Drive, Framingham 01701 (617/443-9521 x3599 days, 872-1882 eves.).
MI: Bob Zwemer, 6408 South Washington, Lansing 48910 (517/393-9287).
NB: Bill Schneider, 1425 North 14th Street, Lincoln 68508 (402/786-2715 days, 476-3671 eves.).
NH: Cregg Reed, RR2, Box 167, Dumbarton 03301 (603/774-5311 eves.).
NY: Peter Karatassos, 756 Foothill Road, Big Flats (607/562-8212 eves.).
PA: Cus Raab, 806 Freedom Circle, Harleysville 19438 (215/368-4866).
TN: Cliff Fiedler, 1908 Belcourt Avenue, Nashville 37212 (615/327-9123).
TX: Mike Allred, 3516 Esplendor Avenue, Irving 65062 (214/256-2882 eves., metro).
TX: "J.J." Johnson, 1603 Elm Street, Georgetown 78626 (512/863-7409; CBBS on 863-0954)
TX: Dan Healy, 11511 Katy Freeway, Suite 150, Houston 77079 (713/496-4660 days).
WA: Rod Proctor, 13520 N.E. 29th Place, Bellevue 98005 (206/453-0635 days, 883-1923 eves., and MicroNet 70110,402).
AUSTRALIA: Peter Wragg, 2 Jilba Street, Indooroopilly, Queensland 4068 (07/378-1623, and CL1641 on The Source).
AUSTRALIA: Dave Dartnall, 20 Eldon Street, Dianella, Western Australia 6062 (09/446-8100).
CANADA: Kalman Fejes, 1149D Meadowlands Drive East, Ottawa, Ontario K2E 6J5 (613/225-2443).
ENCLAND: John Newgas, 1 Philip Court, 89 Hornsey Lane, Highgate, London N6 5LN (01/539-7071 days, 348-6518 eves.).
JAPAN: Akira Akutsu, M.D., 2-176 Issha, Meito, Nagoya, 465.
WEST CERMANY: Nigel Head, Birngartenweg 93, 6100-Darmstadt

NOTE: Program trading is one popular facet of these meetings, but NOT commercial programs and WITHOUT MMSFORTH SYSTEMS aboard! Promote legitimate sharing, discourage pirating, and take care not to jeopardize your own MMSFORTH serial number.

TIME TO RENEW YOUR SUBSCRIPTION!

This issue concludes Volume 2 of the MMSFORTH Newsletter. If you have already paid for Volume 3 ($10.00, including postage), this mailing label will say "V3" in the upper right corner. Please pay within 30 days to stay abreast of all the coming news, information, user-donated programs, etc. (If an article of yours appeared in Volume 2, MMS will treat you to Volume 3 and will list you as an author in the upcoming Annual Index of Volume 2.)

MMS
MILLER MICROCOMPUTER SERVICES
61 LAKE SHORE ROAD, NATICK, MASS. 01760
(617) 653-6136

FIRST CLASS MAIL

For you or your company:

MMSFORTH USER WORKSHOPS FOR 1983

MMS offers the following Boston-area MMSFORTH Workshops for a variety of topics and ability levels. Each offering is subject to sufficient advance enrollment.

Workshop	Days	Cost	Level	Start-Dates
INTRODUCTION TO MMSFORTH	2	$250	Elem	3/18 6/17 9/16 11/18
APPLICATIONS IN MMSFORTH	2	$250	Int	3/21 9/19
DATABASE DESIGN & IMPLEMENTATION	5	$950	Adv	4/18 10/10
METAFORTH & OTHER ADVANCED TOPICS	5	$950	Adv	6/20 12/12
FORTHWRITE USER TECHNIQUES	1	$150	Elem	4/26 7/25 10/24
DATAHANDLER USER TECHNIQUES	1	$150	Elem	4/27 7/26 10/25
FORTHCOM USER TECHNIQUES	1	$150	Elem	4/28 7/27 10/26

Unless otherwise announced, the above workshops are hands-on sessions with ten to twenty attendees, two per computer, from 9:15 a.m. to 4:30 p.m. Principal instructors are our own Tom Dowling (principal author of the MMSFORTH System) and Dick Miller. Costs include lunches and snacks but not transportation or lodging. Hardware is provided; several reduced-price seats are often available in exchange for needed equipment. A 10% discount is available when several attendees from one company co-register.

To attend any of these workshops, pay MMS in full at least 14 days in advance. If you cannot be admitted because the workshop is over or under subscribed, your money will be refunded; if you cancel, your money will not be refunded unless we get a replacement attendee.

Consider using this excellent way to sharpen your Forth programming abilities. P.S.- MMS also can run workshops on these or related topics at your site.

CRYPTOQUOTE PUZZLE, by Jill Miller

The solution to last issue's cryptoquote is:
THERE WAS A WORD I MIGHT HAVE SAID,
BUT WHAT IT WAS I HARDLY KNEW.

Here is a new cryptoquote to solve using the MMSFORTH GAMES DISKETTE:
DA QUO YDMQV XJP DY WVMLNQHJN HP QMSO CDEO FJEO QD HO,
J YDMQVGMLQO YDM HP (LUH BW)/(QMN-80).

THE LAST WORD: "Sing O Heavens and Be Joyful O Earth
            and BREAKFORTH into Singing O Mountains."
- actually observed inscribed in gold letters high on the wall of the Chapel at Asilomar (appropriate site of the 1982 Forth Modification Laboratory).